PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark Office, PCT
2011 South Clark Place Room CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 25 April 2001 (25.04.01)	
International application No. PCT/GB00/03364	**Applicant's or agent's file reference** G/YG/99090 WO
International filing date (day/month/year) 31 August 2000 (31.08.00)	**Priority date** (day/month/year) 31 August 1999 (31.08.99)
Applicant HICKOK, Stephen, Spaulding	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

26 February 2001 (26.02.01)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer S. Mafla
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

Copy for the Elected Office (EO/US)

PCT/GB00/03364

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and Administrative Instructions, Section 422)

To:

MARCH, Gary, Clifford
Brookes Batchellor
102-108 Clerkenwell Road
London EC1M 5SA
ROYAUME-UNI

Date of mailing (day/month/year)	IMPORTANT NOTIFICATION
04 juillet 2001 (04.07.01)	
Applicant's or agent's file reference	
G/YG/99090 WO	
International application No.	**International filing date** (day/month/year)
PCT/GB00/03364	31 août 2000 (31.08.00)

1. The following indications appeared on record concerning:

[ ] the applicant [ ] the inventor [X] the agent [ ] the common representative

Name and Address	State of Nationality	State of Residence
MARCH, Gary, Clifford Batchellor, Kirk & Co. 102-108 Clerkenwell Road London EC1M 5SA United Kingdom		
	Telephone No.: 020 7253 1563	
	Facsimile No.: 020 7253 1214	
	Teleprinter No.:	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

[ ] the person [ ] the name [X] the address [ ] the nationality [ ] the residence

Name and Address	State of Nationality	State of Residence
MARCH, Gary, Clifford Brookes Batchellor 102-108 Clerkenwell Road London EC1M 5SA United Kingdom		
	Telephone No.: 020 7253 1563	
	Facsimile No.: 020 7253 1214	
	Teleprinter No.:	

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

[X] the receiving Office
[ ] the International Searching Authority
[X] the International Preliminary Examining Authority
[ ] the designated Offices concerned
[X] the elected Offices concerned
[ ] other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Dominique DELMAS
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

Form PCT/IB/306 (March 1994)

004127443

Copy for the Elected Office (EO/US)

PCT/GB00/03364

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

To:

MARCH, Gary, Clifford
Maguire Boss
5 Crown Street
St. Ives
Cambridge PE27 5EB
ROYAUME-UNI

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and Administrative Instructions, Section 422)

Date of mailing (day/month/year)
21 August 2001 (21.08.01)

Applicant's or agent's file reference
G/YG/99090 WO

IMPORTANT NOTIFICATION

International application No.
PCT/GB00/03364

International filing date (day/month/year)
31 August 2000 (31.08.00)

1. The following indications appeared on record concerning:

[ ] the applicant [ ] the inventor [X] the agent [ ] the common representative

Name and Address
MARCH, Gary, Clifford
Brookes Batchellor
102-108 Clerkenwell Road
London EC1M 5SA
United Kingdom

State of Nationality

State of Residence

Telephone No.
020 7253 1563

Facsimile No.
020 7253 1214

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

[ ] the person [ ] the name [X] the address [ ] the nationality [ ] the residence

Name and Address
MARCH, Gary, Clifford
Maguire Boss
5 Crown Street
St. Ives
Cambridge PE27 5EB
United Kingdom

State of Nationality

State of Residence

Telephone No.
01480 301588

Facsimile No.
01480 464405

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

[X] the receiving Office
[ ] the International Searching Authority
[X] the International Preliminary Examining Authority
[ ] the designated Offices concerned
[X] the elected Offices concerned
[ ] other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer
DELMAS Dominique

Telephone No.: (41-22) 338.83.38

Form PCT/IB/306 (March 1994)

004225605

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
G/YG/99090 WO		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/GB 00/03364	31/08/2000	31/08/1999
Applicant		
REMEDY RESEARCH LIMITED et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 4

   [X] as suggested by the applicant.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
[redacted]GB 00/03364

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A23L1/304 A61K31/19 A23L3/358 C02F1/50 C09K15/02
A01N59/16 A01N59/20 C09D1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A23L A61L A61K C02F C09D C09K A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, IBM-TDB, FSTA, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 15201 A (PROCTER AND GAMBLE COMPANY) 1 May 1997 (1997-05-01) claims 1,3 page 1, paragraph 2 page 5, paragraph 3 page 5, paragraph 6 page 6, paragraph 3 page 9, paragraph 2; examples 3,5,8,9	1-9,12, 14,15, 25,26,28
X A	DD 277 093 A (MANSFELD KOM W PIECK FORSCHUNG) 21 March 1990 (1990-03-21) claims 1-4 page 2	1-13,15, 28 33,34
A	WO 91 13552 A (TATE DAVID) 19 September 1991 (1991-09-19) claims; examples	1-20,27, 28,32

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

'A' document defining the general state of the art which is not considered to be of particular relevance

'E' earlier document but published on or after the international filing date

'L' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

'O' document referring to an oral disclosure, use, exhibition or other means

'P' document published prior to the international filing date but later than the priority date claimed

'T' later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

'X' document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

'Y' document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

'&' document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
2 January 2001	09/01/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Heezius, A

6

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
[redacted]GB 00/03364

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	DE 16 96 137 B (FMC CORPORATION) 9 March 1972 (1972-03-09) claims 1-3; example 1A	1-20,33, 34
A	US 5 908 647 A (KEDZIERSKI BOGDAN KAZIMIERZ ET AL) 1 June 1999 (1999-06-01) claims 1,2,5,6,8,10,17-20; figure 2 column 12, line 20 -column 13, line 19 column 2, line 5 - line 12 column 4, line 59 -column 5, line 2 column 10, line 39 - line 54	1-26
A	US 5 064 468 A (ODA MITSUYUKI ET AL) 12 November 1991 (1991-11-12) claims 1-4	1,33,34
A	US 5 683 724 A (HEI ET AL.) 4 November 1997 (1997-11-04) claims 1-5,11-14	1,27,29, 30

6

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
[redacted]GB 00/03364

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO 9715201	A	01-05-1997	AU	7455996 A	15-05-1997
			BR	9611253 A	30-03-1999
			CN	1202804 A	23-12-1998
			EP	0871378 A	21-10-1998
			JP	11511337 T	05-10-1999
			PL	326389 A	14-09-1998
			WO	9848648 A	05-11-1998
DD 277093	A	21-03-1990	NONE		
WO 9113552	A	19-09-1991	AT	138244 T	15-06-1996
			AU	657679 B	23-03-1995
			AU	7493391 A	10-10-1991
			DE	69119752 D	27-06-1996
			DE	69119752 T	23-01-1997
			DK	518976 T	14-10-1996
			EP	0518976 A	23-12-1992
			GR	3020865 T	30-11-1996
DE 1696137	B	09-03-1972	GB	1176892 A	07-01-1970
			NL	6603696 A	31-10-1966
			US	3399090 A	27-08-1968
			US	3400027 A	03-09-1968
			US	3406108 A	15-10-1968
US 5908647	A	01-06-1999	US	6066344 A	23-05-2000
			AU	5885696 A	30-12-1996
			WO	9639871 A	19-12-1996
US 5064468	A	12-11-1991	NONE		
US 5683724	A	04-11-1997	US	5674538 A	07-10-1997
			US	5409713 A	25-04-1995
			AU	3758697 A	23-07-1998
			BR	9705133 A	25-05-1999
			CA	2214316 A	17-07-1998
			DE	19751391 A	23-07-1998
			ES	2149080 A	16-10-2000
			FR	2758547 A	24-07-1998
			GB	2321242 A	22-07-1998
			IT	MI980016 A	17-07-1998
			JP	10210959 A	11-08-1998
			NZ	328744 A	19-12-1997
			ZA	9708745 A	30-03-1999
			AU	675975 B	27-02-1997
			AU	5088893 A	11-10-1994
			BR	1100411 A	14-03-2000
			CA	2156299 A	29-09-1994
			CN	1092385 A	21-09-1994
			NZ	255871 A	27-08-1996
			WO	9421122 A	29-09-1994

P67/10.WOP (GCM

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
8 March 2001 (08.03.2001)

PCT

(10) International Publication Number
WO 01/15554 A1

(51) International Patent Classification[7]: A23L 1/304, A61K 31/19, A23L 3/358, C02F 1/50, C09K 15/02, A01N 59/16, 59/20, C09D 1/00

(21) International Application Number: PCT/GB00/03364

(22) International Filing Date: 31 August 2000 (31.08.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
9920539.5 31 August 1999 (31.08.1999) GB
9928337.6 30 November 1999 (30.11.1999) GB

(71) Applicant *(for all designated States except US)*: REMEDY RESEARCH LIMITED [GB/GB]; Unit 10, 1-10 Summers Street, London EC1R 5BD (GB).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: HICKOK, Stephen, Spaulding [US/GB]; Remedy Research Limited, Suite 2, Holland Park Mansions, Holland Park Gardens, London W14 8DY (GB).

(74) Agent: MARCH, Gary, Clifford; Batchellor, Kirk & Co., 102-108 Clerkenwell Road, London EC1M 5SA (GB).

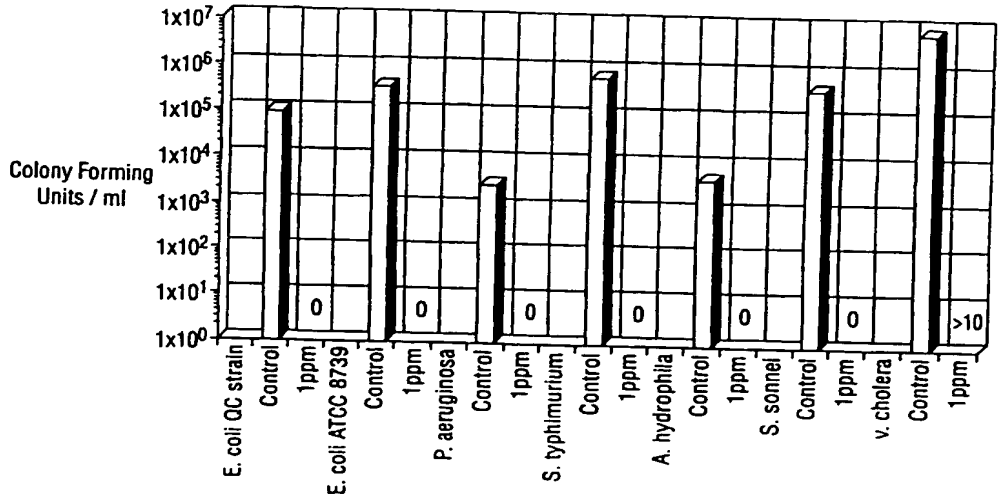
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*
— *Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METAL-CONTAINING COMPOSITIONS, PREPARATIONS AND USES



(57) Abstract: A metal-containing composition substantially comprising (i) at least one water soluble metal compound which forms metal ions when dissolved in water, (ii) at least one metal ion modifier as herein defined, (iii) at least one acid, and (iv) water said composition having a pH of less than 6 and an electrolytic potential in excess of 10 millivolts. Such compositions have uses in the prevention and/or treatment of pathogenic disease or disorder, as foodstuff supplements, in the treatment by disinfection of meat and other foodstuffs, in the coating, sealing and plating of metals, and treatment of water and sewage.

WO 01/15554 A1

INTERNATIONAL SEARCH REPORT

Intern[illegible]cation No
PCT/GB 00/03364

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A23L1/304 A61K31/19 A23L3/358 C02F1/50 C09K15/02
A01N59/16 A01N59/20 C09D1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A23L A61L A61K C02F C09D C09K A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, IBM-TDB, FSTA, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 15201 A (PROCTER AND GAMBLE COMPANY) 1 May 1997 (1997-05-01) claims 1,3 page 1, paragraph 2 page 5, paragraph 3 page 5, paragraph 6 page 6, paragraph 3 page 9, paragraph 2; examples 3,5,8,9	1-9,12, 14,15, 25,26,28
X A	DD 277 093 A (MANSFELD KOM W PIECK FORSCHUNG) 21 March 1990 (1990-03-21) claims 1-4 page 2	1-13,15, 28 33,34
A	WO 91 13552 A (TATE DAVID) 19 September 1991 (1991-09-19) claims; examples	1-20,27, 28,32

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
2 January 2001	09/01/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Heezius, A

6

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Intern[illegible]cation No
PCT/GB 00/03364

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 16 96 137 B (FMC CORPORATION) 9 March 1972 (1972-03-09) claims 1-3; example 1A	1-20,33, 34
A	US 5 908 647 A (KEDZIERSKI BOGDAN KAZIMIERZ ET AL) 1 June 1999 (1999-06-01) claims 1,2,5,6,8,10,17-20; figure 2 column 12, line 20 -column 13, line 19 column 2, line 5 - line 12 column 4, line 59 -column 5, line 2 column 10, line 39 - line 54	1-26
A	US 5 064 468 A (ODA MITSUYUKI ET AL) 12 November 1991 (1991-11-12) claims 1-4	1,33,34
A	US 5 683 724 A (HEI ET AL.) 4 November 1997 (1997-11-04) claims 1-5,11-14	1,27,29, 30

6

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
G/YG/99090		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB00/03364	31/08/2000	31/08/1999
International Patent Classification (IPC) or national classification and IPC A23L1/304		
Applicant REMEDY RESEARCH LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 10 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 6 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☒ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
26/02/2001	07.12.2001
Name and mailing address of the International preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Georgopoulos, N Telephone No. +49 89 2399 2634

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03364

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-18	as originally filed	

Claims, No.:

34	as originally filed	
1-33	with telefax of	19/11/2001

Drawings, sheets:

1/4-4/4	as originally filed	

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)
   see separate sheet

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

   ☐ the entire international application.

   ☒ claims Nos. 25-28, 30-34.

because:

   ☒ the said international application, or the said claims Nos. 25, 27 relate to the following subject matter which does not require an international preliminary examination (*specify*):
   see separate sheet

   ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 25-28, 30-34 are so unclear that no meaningful opinion could be formed (*specify*):
   see separate sheet

   ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

   ☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

   ☐ the written form has not been furnished or does not comply with the standard.

   ☐ the computer readable form has not been furnished or does not comply with the standard.

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

☐ restricted the claims.

☐ paid additional fees.

☐ paid additional fees under protest.

☐ neither restricted nor paid additional fees.

2. ☒ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

☐ complied with.

☒ not complied with for the following reasons:
see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

☐ all parts.

☒ the parts relating to claims Nos. 1-24, 29.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	13, 14, 16, 21-24, 29
	No:	Claims	1-12, 15, 17-20
Inventive step (IS)	Yes:	Claims	21-24, 29
	No:	Claims	1-20
Industrial applicability (IA)	Yes:	Claims	1-24, 29
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Item I

1 The amendments filed with the telefax of 19.11.01 do not fulfil the requirements of Art.34 (2) (b) PCT, as they introduce subject-matter which goes beyond the disclosure in the international application as filed. The amendment concerned is the following:

1.1 *The addition of the expression "nickel, titanium, vanadium, and aluminium" in present independent claim 1*

i/ As far as nickel, titanium and vanadium are concerned, the following is pointed out: Originally filed claim 5 discloses an inorganic salt (and not, generally, "*a compound*" as in present claim 1) of nickel, titanium or vanadium. Moreover, the description as originally filed (see page 13 thereof) discloses specific embodiments of the present invention which do not cover the entire scope of present claim 1.

ii/ As far as aluminium is concerned, only the description as originally filed discloses a metal-containing composition comprising aluminium chloride (see page 12 thereof). However, said composition is merely a specific embodiment of the composition as claimed in present claim 1 and therefore does not cover the entire scope of present claim 1.

From the aforementioned remarks, it can be seen that said amendment leads to a broadening of the invention's scope as originally filed.

2 Hence, the examination will be based on the originally filed application documents.

Item III

3 Lack of clarity of present claims 1-20 and 25-34 as a whole arises (Art.6 PCT), since the plurality of independent claims belonging to the same category (3 "composition" and 7 "use" claims) makes it difficult, if not impossible, to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection. In order to overcome this objection, it would appear appropriate to file an amended set of claims defining the relevant subject-matter in terms of a single independent claim in each category followed by dependent claims covering features which are merely optional.

3.1 However, the International Preliminary Examining Authority has decided that the examination with respect to novelty, inventive step and industrial applicability will be carried out only for the subject-matter of the first independent claim of each category (and all dependent claims thereon).

4 Present claims 25 and 27 are regarded as equivalent to the following claims:
i/ "Process of treating a pathogenic disease or disorder using a composition as claimed in any one of claims 1 to 21 as a medicament"; and
ii/ "Process of eliminating microbes, viruses or funguses using a composition as claimed in any one of claims 1 to 21" (cf. the PCT-Guidelines, C-III, 4.9).
Thus, no international preliminary examination will be carried out for the subject-matter of said claims, as they encompass methods of treatment of human or animal body by therapy (Rule 67 (1) (iv) PCT and the PCT-Guidelines, C-IV, 2.4 (d)).

5 From the above, it can be concluded that examination will be carried out for the subject-matter of present claims 1 to 24 and 29.

Item IV

6 The requirements of unity are not fulfilled for present independent claims 1, 21 and 29, as the "common matter" between said claims (which is the composition of present claim 1) is not new (see point 6.1 below). Therefore, said common matter is not a "special technical feature", because it makes no contribution over the prior art (Rule 13 (1) and (2) PCT).

6.1 However, the International Preliminary Examining Authority chooses not to invite the applicant to restrict the claims or to pay additional fees (Rule 68 (1) PCT), as if the non-novelty of present independent claim 1 can be overcome by the applicant, an inventive step could be acknowledged for its subject-matter (see point 7 below) and the requirements of unity for present independent claims 1, 21 and 29 could be fulfilled.

Item V

7 Reference is made to the following documents:

D1: WO-A-97 15201
D2: DD-A-277 093

8 The subject-matter of present independent claim 1 as well as that of present dependent claims 2 to 12, 15 and 17 to 20 is not new (Art.33 (2) PCT).

8.1 D1 discloses a composition comprising:
i/ ferric sulphate encapsulated in a hydrogenated soybean oil matrix and chelated iron, wherein the chelating agents are amino acids;
ii/ zinc compounds such as zinc sulphate, zinc chloride, zinc citrate;
iii/ an edible acid which lowers the pH from 3.2 to 4.5; and
iv/ tap water (see page 5, textlines 1 to 9 from the bottom; page 6, textlines, 1 to 14 from the top; page 9, textlines 10 to 21 from the top and page 11, textlines 4 to 8 from the bottom in D1).
It is assumed that said composition has an electrolytic potential in excess of 10 mV, as its concentration in the resulting beverage is high enough (35 g/l).
Thus, the subject-matter of present claims 1 to 9, 12, 15 and 17 to 20 is anticipated by D1.

D2 discloses a composition as claimed in any one of present claims 1 to 11 (see page 2, textlines 13 to 25 from the top and claims 1 and 3 of D2).

9 If the applicant establishes novelty for the subject-matter of present independent claim 1, an inventive step could be acknowledged (Art.33 (3) PCT), as present invention's technical advantages of:
i/ improved mineral bio-availability in terms of absorption time (see page 2, lines 16 to 20 of the present description); and
ii/ elimination of algae in water and water disinfection in swimming pools (see page 10, examples 25 and 26 of the present description),
have been mentioned neither in D1 (closest prior art document) nor in D2.

10 In contrast thereto, none of D1 or D2 discloses the sequence of the steps of the method as claimed in present independent claim 21 or a use as claimed in present independent claim 29 (see page 13, example 1 of D1 and claims 1 to 3 of D2).

11 The subject-matter of present independent claim 21 involves an inventive step (Art.33 (3) PCT), for the following reasons:

11.1 D1 is considered to represent the closest prior art document. The technical problem to be solved by the present invention can therefore be seen in as how to provide a method for the production of a metal containing composition which exhibits the following technical advantages:
i/ improved mineral bio-availability in terms of absorption time (see page 2, lines 16 to 20 of the present description); and
ii/ elimination of algae in water and water disinfection in swimming pools (see page 10, examples 25 and 26 of the present description).
Neither D1 nor D2 discloses the sequence of the steps of the method as claimed in present independent claim 21 (see point 8 above). Thus, the person skilled in the art would not be prompted to use the technical teaching of any one of said documents in order to arrive at the claimed method. Consequently, the subject-matter of present independent claim 21 would not be obvious to the person skilled in the art having regard to D1 or D2.

12 The subject-matter of present independent claim 29 also involves an inventive step (Art.33 (3) PCT), the reasons being as follows:

12.1 D1 is considered to represent the closest prior art document. The technical problem to be solved by the present invention can therefore be seen in as how to provide a method for the production of a metal containing composition which exhibits the technical advantages of eliminating algae in water and disinfecting water in swimming pools (see page 10, examples 25 and 26 of the present description).
Neither D1 nor D2 discloses a use as claimed in present independent claim 29 (see point 8 above). Thus, the person skilled in the art would not be prompted to use the technical teaching of any one of said documents in order to arrive at the claimed use. Consequently, the subject-matter of present independent claim 29 would not be obvious to the person skilled in the art having regard to D1 or D2.

13 The subject-matter of present independent claims 1 to 24 and 29 is susceptible of industrial application in the fields of food supplements and / or water treatment industry (Art.33 (4) PCT).

Item VII

14 Contrary to the requirements of Rule 5.1 (a) (ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.

Item VIII

15 It does not seem that the expression "as herein defined" for the "metal ion modifier" in present claim 1 is absolutely necessary (Rule 6.2 (a) PCT and the PCT-Guidelines, C-III, 4.10).

16 Present claims 5, 13, 24 (as far it refers back to claim 13), 28, 31 (because the counterpart of the expression "particularly copper containing such compositions" in said claim, does not exist in the description), 32, 33 (because the counterpart of the wordings "sealing" and "or otherwise forming" in said claim, do not exist in the description) and 34, are not fully supported by the description (Art.6 PCT).

17 The vague and imprecise wording "non-limiting" (see page 7, line 10 of the present description) and statement "and to enable these and other embodiments ... in the art" (see page 7, lines 11 to 12), imply that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them (see also the PCT Guidelines, III - 4.3a).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
G/YG/99090		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB00/03364	31/08/2000	31/08/1999
International Patent Classification (IPC) or national classification and IPC A23L1/304		
Applicant REMEDY RESEARCH LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 10 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which hav been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 6 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☒ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
26/02/2001	07.12.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Georgopoulos, N Telephone No. +49 89 2399 2634

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03364

I. Basis f th report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-18	as originally filed	

Claims, No.:

34	as originally filed	
1-33	with telefax of	19/11/2001

Drawings, sheets:

1/4-4/4	as originally filed	

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)
   see separate sheet

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

   ☐ the entire international application.

   ☒ claims Nos. 25-28, 30-34.

because:

   ☒ the said international application, or the said claims Nos. 25, 27 relate to the following subject matter which does not require an international preliminary examination (*specify*):
   see separate sheet

   ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 25-28, 30-34 are so unclear that no meaningful opinion could be formed (*specify*):
   see separate sheet

   ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

   ☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

   ☐ the written form has not been furnished or does not comply with the standard.

   ☐ the computer readable form has not been furnished or does not comply with the standard.

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

☐ restricted the claims.

☐ paid additional fees.

☐ paid additional fees under protest.

☐ neither restricted nor paid additional fees.

2. ☒ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

☐ complied with.

☒ not complied with for the following reasons:
see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

☐ all parts.

☒ the parts relating to claims Nos. 1-24, 29.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 13, 14, 16, 21-24, 29
	No:	Claims 1-12, 15, 17-20
Inventive step (IS)	Yes:	Claims 21-24, 29
	No:	Claims 1-20
Industrial applicability (IA)	Yes:	Claims 1-24, 29
	No:	Claims

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
s e separate sheet

VIII. Certain bservations n the internati nal applicati n

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

It m I

1 The amendments filed with the telefax of 19.11.01 do not fulfil the requirements of Art.34 (2) (b) PCT, as they introduce subject-matter which goes beyond the disclosure in the international application as filed. The amendment concerned is the following:

1.1 *The addition of the expression "nickel, titanium, vanadium, and aluminium" in present independent claim 1*

i/ As far as nickel, titanium and vanadium are concerned, the following is pointed out: Originally filed claim 5 discloses an inorganic salt (and not, generally, "*a compound*" as in present claim 1) of nickel, titanium or vanadium. Moreover, the description as originally filed (see page 13 thereof) discloses specific embodiments of the present invention which do not cover the entire scope of present claim 1.

ii/ As far as aluminium is concerned, only the description as originally filed discloses a metal-containing composition comprising aluminium chloride (see page 12 thereof). However, said composition is merely a specific embodiment of the composition as claimed in present claim 1 and therefore does not cover the entire scope of present claim 1.

From the aforementioned remarks, it can be seen that said amendment leads to a broadening of the invention's scope as originally filed.

2 Hence, the examination will be based on the originally filed application documents.

Item III

3 Lack of clarity of present claims 1-20 and 25-34 as a whole arises (Art.6 PCT), since the plurality of independent claims belonging to the same category (3 "composition" and 7 "use" claims) makes it difficult, if not impossible, to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection. In order to overcome this objection, it would appear appropriate to file an amended set of claims defining the relevant subject-matter in terms of a single independent claim in each category followed by dependent claims covering features which are merely optional.

3.1 However, the International Preliminary Examining Authority has decided that the examination with respect to novelty, inventive step and industrial applicability will be carried out only for the subject-matter of the first independent claim of each category (and all dependent claims thereon).

4 Present claims 25 and 27 are regarded as equivalent to the following claims:
i/ "Process of treating a pathogenic disease or disorder using a composition as claimed in any one of claims 1 to 21 as a medicament"; and
ii/ "Process of eliminating microbes, viruses or funguses using a composition as claimed in any one of claims 1 to 21" (cf. the PCT-Guidelines, C-III, 4.9).
Thus, no international preliminary examination will be carried out for the subject-matter of said claims, as they encompass methods of treatment of human or animal body by therapy (Rule 67 (1) (iv) PCT and the PCT-Guidelines, C-IV, 2.4 (d)).

5 From the above, it can be concluded that examination will be carried out for the subject-matter of present claims 1 to 24 and 29.

Item IV

6 The requirements of unity are not fulfilled for present independent claims 1, 21 and 29, as the "common matter" between said claims (which is the composition of present claim 1) is not new (see point 6.1 below). Therefore, said common matter is not a "special technical feature", because it makes no contribution over the prior art (Rule 13 (1) and (2) PCT).

6.1 However, the International Preliminary Examining Authority chooses not to invite the applicant to restrict the claims or to pay additional fees (Rule 68 (1) PCT), as if the non-novelty of present independent claim 1 can be overcome by the applicant, an inventive step could be acknowledged for its subject-matter (see point 7 below) and the requirements of unity for present independent claims 1, 21 and 29 could be fulfilled.

Item V

7 Reference is made to the following documents:

D1: WO-A-97 15201
D2: DD-A-277 093

8 The subject-matter of present independent claim 1 as well as that of present dependent claims 2 to 12, 15 and 17 to 20 is not new (Art.33 (2) PCT).

8.1 D1 discloses a composition comprising:
i/ ferric sulphate encapsulated in a hydrogenated soybean oil matrix and chelated iron, wherein the chelating agents are amino acids;
ii/ zinc compounds such as zinc sulphate, zinc chloride, zinc citrate;
iii/ an edible acid which lowers the pH from 3.2 to 4.5; and
iv/ tap water (see page 5, textlines 1 to 9 from the bottom; page 6, textlines, 1 to 14 from the top; page 9, textlines 10 to 21 from the top and page 11, textlines 4 to 8 from the bottom in D1).
It is assumed that said composition has an electrolytic potential in excess of 10 mV, as its concentration in the resulting beverage is high enough (35 g/l).
Thus, the subject-matter of present claims 1 to 9, 12, 15 and 17 to 20 is anticipated by D1.

D2 discloses a composition as claimed in any one of present claims 1 to 11 (see page 2, textlines 13 to 25 from the top and claims 1 and 3 of D2).

9 If the applicant establishes novelty for the subject-matter of present independent claim 1, an inventive step could be acknowledged (Art.33 (3) PCT), as present invention's technical advantages of:
i/ improved mineral bio-availability in terms of absorption time (see page 2, lines 16 to 20 of the present description); and
ii/ elimination of algae in water and water disinfection in swimming pools (see page 10, examples 25 and 26 of the present description),
have been mentioned neither in D1 (closest prior art document) nor in D2.

10 In contrast thereto, none of D1 or D2 discloses the sequence of the steps of the method as claimed in present independent claim 21 or a use as claimed in present independent claim 29 (see page 13, example 1 of D1 and claims 1 to 3 of D2).

11 The subject-matter of present independent claim 21 involves an inventive step (Art.33 (3) PCT), for the following reasons:

11.1 D1 is considered to represent the closest prior art document. The technical problem to be solved by the present invention can therefore be seen in as how to provide a method for the production of a metal containing composition which exhibits the following technical advantages:
i/ improved mineral bio-availability in terms of absorption time (see page 2, lines 16 to 20 of the present description); and
ii/ elimination of algae in water and water disinfection in swimming pools (see page 10, examples 25 and 26 of the present description).
Neither D1 nor D2 discloses the sequence of the steps of the method as claimed in present independent claim 21 (see point 8 above). Thus, the person skilled in the art would not be prompted to use the technical teaching of any one of said documents in order to arrive at the claimed method. Consequently, the subject-matter of present independent claim 21 would not be obvious to the person skilled in the art having regard to D1 or D2.

12 The subject-matter of present independent claim 29 also involves an inventive step (Art.33 (3) PCT), the reasons being as follows:

12.1 D1 is considered to represent the closest prior art document. The technical problem to be solved by the present invention can therefore be seen in as how to provide a method for the production of a metal containing composition which exhibits the technical advantages of eliminating algae in water and disinfecting water in swimming pools (see page 10, examples 25 and 26 of the present description).
Neither D1 nor D2 discloses a use as claimed in present independent claim 29 (see point 8 above). Thus, the person skilled in the art would not be prompted to use the technical teaching of any one of said documents in order to arrive at the claimed use. Consequently, the subject-matter of present independent claim 29 would not be obvious to the person skilled in the art having regard to D1 or D2.

13 The subject-matter of present independent claims 1 to 24 and 29 is susceptible of industrial application in the fields of food supplements and / or water treatment industry (Art.33 (4) PCT).

It m VII

14 Contrary to the requirements of Rule 5.1 (a) (ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.

Item VIII

15 It does not seem that the expression "as herein defined" for the "metal ion modifier" in present claim 1 is absolutely necessary (Rule 6.2 (a) PCT and the PCT-Guidelines, C-III, 4.10).

16 Present claims 5, 13, 24 (as far it refers back to claim 13), 28, 31 (because the counterpart of the expression "particularly copper containing such compositions" in said claim, does not exist in the description), 32, 33 (because the counterpart of the wordings "sealing" and "or otherwise forming" in said claim, do not exist in the description) and 34, are not fully supported by the description (Art.6 PCT).

17 The vague and imprecise wording "non-limiting" (see page 7, line 10 of the present description) and statement "and to enable these and other embodiments ... in the art" (see page 7, lines 11 to 12), imply that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them (see also the PCT Guidelines, III - 4.3a).

"Metal-containing Compositions, Preparations and Uses"

It is well established that minerals i.e. traces of selected metal elements are required as part of the human diet for good health. Mineral deficiencies can lead to poor health and specific disorders. Amongst the minerals that the body requires, there are, for example, the metals zinc, magnesium, copper, iron, and selenium. The human body requires traces of such minerals in soluble form whereby the corresponding metallic ions are bio-available within the bloodstream.

With the increase in highly processed and convenience foods, there are concerns that the typical diet in today's conditions may not contain sufficient vitamins and/or minerals. Accordingly vitamin and mineral supplements are widely available without prescription on the basis that they are foodstuff components and not medicaments.

This invention is particularly concerned with mineral metal compositions, their preparation and uses within a mineral 'delivery' system for humans or animals. It is known that mineral salts by themselves, e.g. zinc sulphate, iron sulphate and the like will dissociate in aqueous solution to form the corresponding ions e.g. Zn^{2+} and Fe^{2+} with SO_4^{2-}. However, it has been observed that the metallic mineral ions in solution within the bloodstream are not readily bio-available in the sense of being available for uptake by cells. Accordingly there are at least two mineral 'binder' systems available for enhancing bio-availability of these ions. Most mineral supplement compositions presently available are based upon an inorganic chelate binder system. In such compositions, the required mineral element e.g. zinc, magnesium or the like is chemically bonded to a chelate such that bio-availability of the mineral ions is still significantly impaired. The digestive system has difficulty in leaching the mineral element away from the chelate binder for cellular uptake. This limits their bio-availability. Chelate based mineral supplements apparently limit the body's absorption of the elemental mineral to some 7 to 10% of that presented. It is suggested that the remaining mineral content is not absorbed into the bloodstream, but is passed in the urine or faeces. Chelate-bound iron mineral supplements, in

particular, can cause constipation as the chelate can act as a flocculent in the large intestine. It is desirable that such disadvantage be overcome in an alternative mineral 'delivery' system with improved bio-availability of the mineral elements.

Another mineral supplement composition is based upon a mineral salt combined with an organic glutamate binder. One product based upon the glutamate bound mineral delivery system is a lozenge containing zinc for oral ingestion. However, not only does the glutamate delivery system demonstrate restricted mineral element/ion bio-availability in similar fashion to the chelates described above, but also zinc glutamate lozenges in particular tend to leave undesirable coloured stains in the mouth. Accordingly it is also desirable to overcome this particular disadvantage in an alternative mineral delivery system providing better mineral element bio-availability.

In consequence it can be summarised that the existing chelate and glutamate bound mineral compositions deliver such mineral elements into the bloodstream but only a small proportion of the total content of the respective mineral element, and over a relatively lengthy period of time whereby specific mineral bio-availability is limited.

The present inventor has considered the existing mineral delivery systems such as the chelate and glutamate delivery systems and their disadvantages. The present invention provides inter alia, alternative mineral delivery systems based on quite different components which have been found to improve specific mineral bio-availability in terms of not only bloodstream quantities but also bloodstream absorption time.

The present inventor provides several aspects to his invention, based upon mineral or other metallic element – containing compositions, methods for preparing such compositions and uses of such compositions which encompass several distinct technical fields apart from the field of mineral supplements for the human or animal diet, namely uses of the compositions for medical conditions in the treatment of a disease or disorder, treating or purifying water or sewage, use as an algaecide, fungicide and disinfectant and uses in treating metal substrates to control corrosion.

Accordingly in a first aspect of this invention there is provided a metal-containing composition substantially comprising:

(i) at least one water soluble metal compound which forms metal ions when dissolved in water,

(ii) at least one metal ion modifier as herein defined,

(iii) at least one acid, and

(iv) water

said composition having a pH of less than 6 and an electrolytic potential in excess of 10 millivolts.

The term 'metal' is used herein to encompass semi-metals of a mineral nature, e.g. selenium.

Such compositions preferably essentially consist of the aforesaid components with any preferred additives and more preferably consist of such ingredients, optional additives and the balance being any inevitable impurities.

In a second aspect of this invention there is provided a method of making a composition as defined in the first aspect comprising dissolving (i) in distilled water, adding (ii) and mixing or allowing to dissolve, then adding (iii) whilst simultaneously monitoring the pH and electrolytic potential of the composition until a required value of each measurement is obtained.

A third aspect of this invention provides the use of a composition as defined in the first aspect in medicine, for example the use of such a composition for preventing or treating one or more of the following pathogenic disorders, namely bacterial, fungal or viral infection, retroviral infection such as AIDS or Hepatitis C, particularly including copper containing such compositions for treating one or more of the following diseases. namely cholera, salmonella, shigella, E.Coli and chlamydia.

A fourth aspect of this invention provides the use of a composition as defined in the first aspect, in the preparation of a medicament for use in the treatment of a disease or disorder, such as one or more of the aforementioned diseases or disorders.

The invention also provides in a fifth aspect the use of a composition as defined in the first aspect in the treatment of water or water containing materials or sewage, effluent, commercial, domestic waste products as a bactericide, or algaecide, flocculent viricide and/or fungicide.

A sixth aspect of the present invention provides the use of a composition as defined in the first aspect to form a corrosion resistant coating or plating for metal substrates, to act as a sealant against metal corrosion.

In a seventh aspect the present invention provides the use of a composition as defined in the first aspect as a bactericidal and/or fungicidal preservative against the bacterial or fungal deterioration of edible foodstuffs.

The metal ion modifier is preferably a binder other than chelate or glutamate effective to transport ions incorporating the metallic mineral element through the digestive system and into the bloodstream in bioavailable form. Such binder can be, for example, a complexing, buffering or sequestering agent. It is most preferred to use soluble ammonium compounds, such as one or more of the following ammonium salts: ammonium chloride, sulphate or phosphate.

Such metal ion modifiers appear particularly effective in retaining and sustaining electrolytic potential.

The present invention is based on the inventor's discoveries that an improved metallic mineral delivery system for the human or animal bloodstream and other uses can be formulated from selected metal-containing electrolytes in acidic aqueous media which demonstrate a measurable electrolytic potential which is stable for a significant period of time. Such compositions have surprisingly been found, inter alia, when

ingested or absorbed to make the mineral ions more rapidly available to the body for cellular uptake, and more efficiently and sustainably in terms of percentage by weight of bio-available mineral within the bloodstream, after a given time. Additionally it would appear that the ions incorporating the metallic mineral element are more bio-active due to enhanced beneficial effects which have been observed. The ions incorporating the metallic mineral element appear to be polarised, with an overall cationic charge. Accordingly, within the present compositions, the metallic element effects appear to be synergistically improved by the metal ion modifier. In particular this appears to be the case with zinc and magnesium compositions.

In preferred embodiments of the invention, the metal compositions are mineral metal such compositions and can act transdermally by passing through the skin, mucosa or other mucous membrane, for even more rapid absorption into the bloodstream.

Preferred embodiments of the compositions for dietary supplement or medical uses can provide up to 90% by weight of the mineral element absorbed into the bloodstream, in bio-available and potentially more bio-active form in up to 10 minutes e.g. within 6 to 10 minutes. Accordingly such compositions for dietary or medical uses in the form of acidic aqueous electrolyte solutions can provide for rapid mineral element ion delivery to the body for cellular uptake, with less wastage of the desirable mineral passing in the urine and/or faeces.

In the case of preferred compositions which contain iron or zinc as the mineral element, it is possible to avoid the disadvantages of chelated iron and zinc glutamate mentioned above, whilst simultaneously providing more of these mineral elements available in the bloodstream in less time and again apparently in a more bio-active form.

The present compositions for human or animal dietary or medical use are preferably based upon the presence of at least one water soluble metal compound such as a mineral metal salt in aqueous compositions which further contain components as

defined in the first aspect and all of which said components have been designated GRAS (generally regarded as safe) food additives or other chemicals by the US-FDA

In order to make the present compositions for human or animal dietary or medical use, it is preferred for the following general preparative procedure to be adopted:

General Procedure

(a) The required metal such as a mineral element e.g. zinc is included by way of a soluble salt of the metal such as zinc sulphate. This is to be completely dissolved in distilled water (in contrast to deionised water) preferably 1 litre by mixing the salt into the water at ordinary room temperature, e.g. about 20°C by vigorous stirring. The corresponding metallic mineral ions thereby form in the aqueous solution.

(b) When all the metallic salt has been completely dissolved in the distilled water, at least one metal ion modifier is added, preferably a sequestering, buffering or complexing agent such as one or more soluble ammonium salts, for example one or more of: ammonium sulphate, ammonium chloride, ammonium citrate, and ammonium phosphate, which is mixed into the solution to dissolve therein.

(c) To the aqueous mixture, obtained in step (b), at least one acid component (e.g. sulphuric and/or citric acid or hydrochloric acid) is added carefully and slowly, preferably by measured metering , to lower the pH of the mixture to a preferred level and to simultaneously exhibit a measurable electrolytic potential until a preferred level thereof is also reached. The value of electrolytic potential is preferably measured and monitored by milli-voltmeter. Several commercially available instantaneous readout pH meters can function as a milli-voltmeter by simple adjustment. Sufficient acid should be added so as to control the values of pH and electrolytic potential. This process for making the aqueous metal-containing compositions, particularly mineral metal such compositions for dietary or medical use, can be likened to a form of electrometric titration.

The inventor has observed that in many embodiments, after completion of step (c) - the addition of one or more appropriate acids, most preferably GRAS designated acids,

the compositions exhibit behaviour associated with dynamic equilibrium solutions at relatively high electrolytic potential. An exothermic reaction during step (c) may be observed. The aqueous compositions in many embodiments also appear to demonstrate the characteristics of an overall cationic solution in which positively charged cations including the metallic element outnumber the anions. Furthermore such cations when present in the bloodstream appear to be attracted to and thereby damage or destroy pathogenic cells having an overall negative charge, such as bacterial, fungal or viral cells.

In order that the invention in all its aspects may be further elucidated a plurality of non-limiting examples are now presented in tabular form for a more complete appreciation of the invention, and to enable these and other embodiments of the invention to be reduced to practice by one of ordinary skill in the art. The preparative procedure in each example corresponds to the general procedure already outlined above, using 1 litre of distilled water, or 860mls in the case of example 13a.

For the medical fields of application, the formulations can be administered orally in the range of 1 drop to 15 drops, dissolved in more water, once, twice or three times daily, depending upon the severity of the condition.

For the non-medical fields of application, the quantities to be used can be varied according to economics, effects desired, volume of material (eg water) to be treated. The precise amounts are rather less critical and adjustments can be made by the user.

It will be appreciated that where the metal compound is a sulphate, then the metal ion modifier is preferably also a sulphate and the acid preferably is sulphuric.

Similarly where the metal compound is a chloride, the ion modifier is preferably also a chloride and the acid is preferably hydrochloric. Where the metal ion modifier is a phosphate, it is preferred to use phosphoric acid as the acid, whatever metal salt is used as the source of metallic ions.

Example No.	Mineral or other Metal Element(s) in Composition	Compound(s) /Amount	Metal ion Modifier(s) / Amount	Acid(s)/ Amount	Optional Additive(s)	Final pH	Final Electrolytic Potential Millivolts (mV)	Field(s) of Application
1	Copper	Copper Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% 37.5 mls	-	< 1.5	350-380	Medical, Anti-bacterial especially against Helicobacter Pylori
2	Copper	Copper Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable*	-	1-2	> 300	Medical, anti mycological Treatment
3	Copper	Copper Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	< 2	> 350	Medical arthritis Alleviation
4	Copper	Copper Sulphate 200g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1.5	> 350	Substantial copper dietary supplement
5	Magnesium	Magnesium Sulphate/ 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	Vitamin B1 Vitamin B3	1-2	> 350	Medical, antiviral
6	Magnesium	Magnesium Sulphate/ 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1-2	> 350	Medical asthma treatment or prevention
7	Magnesium	Magnesium Sulphate/ 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1-2	> 350	Medical, stroke treatment and prophylactic
8	Magnesium	Magnesium Sulphate/ 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	Malic acid	1-2	> 350	Medical, treatment for Chronic fatigue syndrome
9	Magnesium	Magnesium Sulphate/ 100g	Ammonium Phosphate 60g	Phosphoric Acid Concentrated 40mls	Malic acid 40g	1-2	> 350	As for example 8 and also for combatting side effects in patients with retroviral disease such as AIDS and/or Hepatitis C
10	Magnesium	Magnesium Sulphate/ 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	Natural Diuretic	1-2	> 350	Medical relief of pre-menstrual tension

11	Magnesium	Magnesium Sulphate/ 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	Melatonin Valerian	1-2	> 350	Medical treatment of insomnia
12	Magnesium	Magnesium Sulphate 200g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1-2	> 350	Substantial magnesium dietary supplement
13	Selenium	Selenium Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1-2	>350	Medical treatment of cancer
13a	Selenium	Selenic Acid H_2O_4Se 50g	Ammonium Phosphate 80g	Phosphoric Acid Concentrated 40 mls	-	1-2	> 350	Composition for use in the treatment of cancer, Hepatitis C and AIDS. Topical formulation of this composition has indications for treatment of melanoma
14	Iron	Iron Sulphate 200g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1-2	> 350	Substantial iron dietary supplement
15	Zinc	Zinc Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	Vitamin C	1-2	> 350	Medical, antiviral, particularly anti-retroviral eg Aids & Hepatits C
16	Zinc	Zinc Sulphate 200g	Ammonium Sulphate 75g	Sulphuric 98% variable	Stimulants - caffeine, Nicotine and ginseng	1-2	> 350	Medical, alertness enhancer, potential hangover remedy
17	Zinc	Zinc Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1-2	> 350	Substantial zinc dietary supplement

18	Zinc	Zinc Sulphate 200g	Ammonium Sulphate 75g	Sulphuric 98% Variable	Vitamin B5 Vitamin B6 To accelerate Zinc Delivery	1-2	> 350	Medical - to counter side Effects of chemotherapy
18a	Zinc	Zinc Sulphate 100g	Ammonium Sulphate 65g	Phosphoric acid concentrated 40mls	Citric acid 30g (catalyst) and pyruvic acid 50g (co-enzyme)	1-2	> 350	Same as example 43 a more preferred formulation, suitable for AIDS patients with mitochondrial dysfunction or otherwise damaged by reverse transcriptase inhibitors
19	Copper	Copper Sulphate 150g	Ammonium Phosphate 75g	Phosphoric Acid Variable	-	1-2	> 350	Fungicide, soil sterilant to replace methyl bromide, transdermal fungicide
20	Copper	Copper Sulphate 150g	Ammonium Chloride 75g	Hydrochloric acid- concentrated variable	-	1-2	> 350	As example 1
21	Copper	Copper Sulphate 150g	Ammonium Chloride 75g	Hydrochloric acid- concentrated variable	-	1-2	> 350	As example 3
22	Copper	Copper Sulphate 150g	Ammonium Chloride 75g	Hydrochloric Acid- concentrated Variable	-	1-2	> 350	Medical, fungicide, oral and/or topical formulations
23	Zinc	Zinc Sulphate 150g	Ammonium Chloride 75g	Hydrochloric Acid- concentrated Variable	-	1-2	> 350	Medical, antiviral
24	Copper	Copper Sulphate 200g	Ammonium Sulphate 75g	Sulphuric acid 98% variable	-	1-2	> 350	Water purification - disinfectant
25	Copper	Copper Sulphate 200g	Ammonium Sulphate 75g	Sulphuric acid 98% variable	-	1-2	> 350	Water treatment - algaecide
26	Copper	Copper Sulphate 200g	Ammonium Sulphate 75g	Sulphuric Acid 98% Variable	-	1-2	> 350	Water treatment - swimming pool disinfectant

27	Copper	Copper Sulphate 200g	Ammonium Sulphate 75g	Sulphuric Acid 98% Variable	-	1-2	> 350	Sewage treatment - disinfectant
28	Iron	Iron Sulphate 150g	Ammonium Sulphate 75g	Sulphuric Acid 98% Variable	-	1-2	> 350	Water treatment - flocculent
28a	Iron	Iron II Sulphate mononhydrate 133.33g ($FeSO_4.H_2O$) Molecular weight=151.91 Fe content per mole = 55.85 Fe content = 36.76% by weight	Ammonium Sulphate 66.66g	Sulphuric acid concentrated 99% 33.33mls	-	0.79	391	Water treatment, flocculant, removal of organic matter
28b	Iron	Iron II Sulphate Heptahydrate 200g $FeSO_4.7H_2O$ Molecular weight = 278.01 Fe content = 20.08% by weight	Ammonium Sulphate 100g	Sulphuric acid concentrated 99% 50mls	-	0.17	385	As example 28a
28c	Iron	Iron III Sulphate monohydrate 200g $Fe_2(SO_4)_3$	Ammonium Sulphate 100g	Sulphuric acid concentrated 99% 50mls	-	0.15	404	As example 28a
28d	Iron	Iron III Chloride 200g $FeCl_3$	Ammonium chloride 100g	Hydrochloric acid 35-38% by volume, specific gravity 1.18 50mls	-	-0.45	436	As example 28a

28e	Aluminium	Aluminium Chloride 300g molecular weight 241.43 Al content 26.98% by weight	Ammonium Chloride 150g	Hydrochloric acid 35-38% by volume, specific gravity 1.18 75mls	-	-0.98	466	As example 28a
29	Copper	Copper Sulphate 150g	Ammonium chloride 75g	Hydrochloric acid-concentrated variable	-	1-2	> 350	As example 1
30	Copper	Copper Sulphate 150g	Ammonium chloride 75g	Hydrochloric acid-concentrated variable	-	1-2	> 350	As example 26
31	Copper	Copper	Ammonium chloride 75g	Hydrochloric acid-concentrated variable	-	1-2	> 350	Sewage treatment - disinfectant for sewage solids
32	Copper	Copper Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1-2	> 350	Food preservation fungicide spray for fruit and vegetables
33	Copper	Copper Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1-2	> 350	Food preservation - meat disinfectant
34	Copper	Copper Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	Fructose	1-2	> 350	Flower, tree and shrub preservation e.g. christmas trees - bactericide and fungicide
35	Copper	Copper Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1-2	> 350	Food preservation seafood preservative
36	Copper	Copper Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1-2	> 350	Food preservation - for fruit and vegetables

37	Copper	Copper Sulphate 150g	Ammonium Chloride 75g	Hydrochloric acid- concentrated variable	-	1-2	> 350	Food preservation- food processing area sanitiser
38	Copper	Copper sulphate 300g	Ammonium sulphate 82.5g	Sulphuric 98% variable	-	1-2	> 350	Metal preservation - metal sealing, plating and anti-corrosion
39	Nickel	Nickel sulphate 300g	Ammonium sulphate 82.5g	Sulphuric 98% variable	-	1-2	> 350	As example 38
40	Nickel	Nickel sulphate 200g	Ammonium sulphate 75g	Sulphuric 98% variable	Zinc sulphate	1-2	> 350	Industrial-algaecide and bactericide particularly in cooling towers to inhibit legionella bacteria
41	Titanium	Titanium sulphate 300g	Ammonium sulphate 82.5g	Sulphuric 98% variable	-	1-2	> 350	As example 38
42	Vanadium	Vanadium sulphate 300g	Ammonium sulphate 82.5g 1	Sulphuric 98% variable	-	1-2	> 350	As example 38
43	Zinc	Zinc sulphate 150g	Ammonium phosphate 75g	Phosphoric acid variable	Citric Acid	1-2	> 350	Medical, for use in repairing impaired/damaged mitochondria e.g. in patients with AIDS presently taking more than one AIDS treatment drug.
44	Magnesium	Magnesium sulphate 150g	Ammonium phosphate 75g	Phosphoric acid variable	Malic Acid	1-2	> 350	Medical, for use in repairing impaired/damaged mitochondria e.g. in patients with AIDS presently taking more than one AIDS treatment drug.
45	Zinc	Zinc sulphate 150g	Ammonium phosphate 75g	Phosphoric acid variable	Citric acid And Pyruvic acid	1-2	> 350	Medical - for use in treating ME chronic fatigue Syndrome

46	Magnesium	Magnesium sulphate 150g	Ammonium phosphate 75g	Phosphoric Acid variable	Malic acid	1-2	> 350	Medical - for use in treating ME chronic fatigue syndrome

* N.B. variable denotes amount adjusted to obtain required specific pH and mV values, low pH and high mV being preferred.

From these examples it will be appreciated that the compositions may include one or more other additional components, besides the metal such as the preferred mineral, metal ion modifer, acid and water. By way of example, in zinc mineral compositions for dietary supplements or medical use it is preferred to incorporate one or more of the water soluble vitamins C, B5 and B6, each of which appear to play a role in accelerating delivery of the zinc mineral to cells via the bloodstream, to enhance the beneficial zinc ion effects .

In the case of magnesium mineral compositions for treating or preventing viral infections, it is preferred to include vitamins B1 and B3 to promote or synergise such beneficial anti-viral properties of the magnesium ion.

In the case of magnesium mineral compositions for treating chronic fatigue syndrome, it is preferred to include malic acid because it is useful for the same purpose. Compositions based on magnesium for treating PMT (pre-menstrual tension) preferably also include a natural diuretic to relieve water retention and for such compositions intended to treat insomnia, it is preferred also to include known sleep enhancers such as valerian or rapid eye movement extenders such as melatonin.

Zinc mineral compositions intended for enhancing vitality and for countering the effects of tiredness may further contain one or more of the following or other stimulants: caffeine, nicotine and ginseng.

The present compositions when used as a mineral source for rapid ingestion can demonstrate the following properties and advantages:

(1) An ability to bind metal ions, eg from salts through the action of at least one metal ion modifier within the acidic, electrolytically active aqueous solution. In this regard, the metal ion modifier appears to act as a binder and/or buffering agent which links up with the metal ions, and which 'buffers' those desirable metal ions against removal from the bloodstream.

(2) An ability to deliver and retain those mineral metals in an ionically modified form in the human or animal bloodstream through the buccal muscosa, oesophagus or stomach rapidly, i.e within a few minutes.

(3) The ionically modified mineral metal ions appear to remain in the blood serum to facilitate bio-availability of the specific mineral metal for cellular uptake, and moreover certain effects which have been observed appear to indicate that it is not only the bio-availability which is enhanced, but also and quite surprisingly the bioactivity of the mineral. This could be due to the apparent stability of overall cationic charge of the ions incorporating the metal.

(4) The ionically modified mineral metal ions retain a net positive electrical charge which interacts with negatively charged virus, bacteria or fungal cells, forming a complex with these pathogens.

(5) The ionically modified mineral metal ions in solution carry and appear to have the ability to deliver an electrical charge. This charge coupled with the overall mineral metal delivery system and the selected mineral metals help to control pathogens (bacteria, fungi and virus) apparently by degrading their membranes, complexing the pathogens thereby rendering them inactive or otherwise unable to harm the host's body. In this regard the present mineral metal compositions when delivered into the bloodstream, help the body's natural immune system to fight infection.

(6) Substantially improved bio-availability of the mineral in the bloodstream after digestion or absorption in terms of mineral quantity and substantially reduced time for the mineral to become bio-available after digestion or absorption i.e. rapid absorption.

(7) Additional medical benefits have surprisingly been found above and beyond the known benefits of mineral supplements. The present compositions have a wide variety of uses in medicine as hereinbefore described and whilst such benefits have been shown applicable to the treatment of human disease, similar uses are proposed in the

treatment of animals by way of using the present compositions as veterinary mineral supplements.

The present compositions may be formulated as aqueous solutions and presented for use and/or sale within dropper bottles for convenient addition to foodstuffs, beverages or to water for consumption. Alternatively the compositions can be applied directly to the buccal mucosa for even more rapid mineral metal absorption into the bloodstream.

Alternatively the compositions may be formulated as capsules containing a unit dose, or presented in tablet form after evaporating or freeze drying the compositons in such a manner that the pH and electrolytic potential can be substantially restored to the preferred values described herein by the presence of acid in the stomach.

In order that application of the invention may be demonstrated, reference is now made to the accompanying drawings and the following non-limiting examples.

Figure 1 shows the antibacterial activity of Example 24 against Escherichia coli QC strain at a variety of dilutions. Exposure was for one hour at 37 degrees centigrade. Under these testing conditions, a dilution of as little as 0.04 ppm was still effective in reducing bacterial counts by 99.9%. Recommended dosage is at the 1ppm level.

Actual Data:

Control: (0 ppm)	$9x10^4$ cfu/ml (colony forming units/millilitre)
1.0 ppm:	No recoverable bacteria
0.2 ppm:	No recoverable bacteria
0.04 ppm:	12.7 cfu/ml
0.008 ppm:	1×10^4 cfu/ml
0.0016 ppm:	6.4×10^5 cfu/ml

Figure 2 shows the results of treating a treatment plant effluent with a formulation according to Example 24, wherein the colony forming units plotted are of residual fecal coliforms. The conditions leading to these results were as follows:

1 hour Exposure Time, 22 Degrees Centigrade

Typical Effluent Conditions, Mg / L:	
Dissolved Oxygen	4.8
COD	106
pH (max)	7.5
pH (min)	7.1
Ammonium (NH3-N)	9.0
Total N (Kjeldahl)	9.4
Nitrogen Species (NOx)	3.8
BOD	12

Figure 3 shows the antibacterial activity of an example 24 formulation against Escherichia coli QC strain at a 1ppm concentration. Exposure was for one hour at 37 degrees centigrade in 1 mM PO_4 buffer.

Actual Data:

Control: (0 ppm)	9×10^4 cfu/ml
1ppm:	No recoverable bacteria

Further results against a variety of bacteria using a formulation corresponding to Example 24 are shown in figure 4. The conditions were broadly similar to those described with reference to Figure 3.

The figures demonstrate the bacteriocidal activity.

CLAIMS

1. A metal-containing composition substantially comprising

(i) at least one water soluble metal compound which forms metal ions when dissolved in water,

(ii) at least one metal ion modifier as herein defined,

(iii) at least one acid, and

(iv) water

said composition having a pH of less than 6 and an electrolytic potential in excess of 10 millivolts.

2. A composition as claimed in claim 1 wherein said metallic element is one or more of the following mineral metals : copper, magnesium, selenium, iron and zinc.

3. A composition as claimed in claim 1 or 2 which essentially consists of (i) – (iv) as defined in claim 1.

4. A composition as claimed in any preceding claim which consists of (i) – (iv) as defined in claim 1 apart from any unavoidable impurities.

5. A composition as claimed in any preceding claim wherein (i) is an inorganic salt of zinc, magnesium, copper, selenium, iron, nickel, titanium or vanadium.

6. A composition as claimed in claim 5 in which said salt (i) is sulphate, chloride or nitrate.

7. A composition as claimed in claim 5 or 6 in which said salt (i) is a zinc, magnesium, copper, iron or selenium salt.

8. A composition as claimed in claim 7 in which (i) is zinc sulphate, magnesium sulphate, iron sulphate or copper sulphate.

9. A composition as claimed in any preceding claim in which the metal ion modifier (ii) is at least one metal ion binding, complexing, or sequestering agent.

10. A composition as claimed in any preceding claim wherein (ii) comprises one or more inorganic ammonium compounds capable of dissociating in water into

ammonium ions such as one or more of: ammonium sulphate, ammonium chloride, ammonium phosphate, and ammonium citrate.

11. A composition as claimed in claim 10 wherein (ii) is ammonium sulphate.

12. A composition as claimed in any preceding claim in which (iii) comprises one or more of sulphuric, hydrochloric, phosphoric and citric acids.

13. A composition as claimed in claim 12 wherein (iii) is concentrated sulphuric or hydrochloric acid.

14. A composition as claimed in any preceding claim in which (iv) consists essentially of distilled water or entirely of distilled water apart from any unavoidable impurities.

15. A composition as claimed in any preceding claim in which the pH value is less than 5, preferably less than 4, more preferably less than 3, most preferably less than 2.5.

16. A composition as claimed in claim 15 in which the pH value is 2 or less such as in the range of 1 to 2.

17. A composition as claimed in any preceding claim in which the electrolytic potential is in excess of 20 millivolts, preferably in excess of 50 millivolts and more preferably in excess of 100 millivolts.

18. A composition as claimed in claim 17 in which the electrolytic potential is in excess of 200 millivolts.

19. A composition as claimed in claim 18 in which the electrolytic potential is in excess of 300 millivolts and preferably at least 340 millivolts.

20. A composition as claimed in claim 19 in which the electrolytic potential is in the range of 340 to 400 millivolts.

21. A method of making a composition as claimed in any preceding claim comprising dissolving (i) in distilled water, adding (ii) and mixing or allowing to dissolve,

then adding (iii) whilst simultaneously monitoring the pH and electrolytic potential of the composition until a required value of each measurement is obtained.

22. A method as claimed in claim 21 in which (i) is as defined in any one of claims 5 to 8.

23. A method as claimed in claim 21 or 22 in which (ii) is as defined in any one of claims 9 to 11.

24. A method as claimed in any one of claims 21 to 23 wherein (iii) is as defined in claim 12 or 13.

25. Use of a composition as claimed in any one of claims 1 to 21 as a medicament for treating or preventing a pathogenic disease or disorder.

26. A composition as claimed in any one of claims 1 to 21 for the preparation of a medicament for treating or preventing a pathogenic disease or disorder.

27. Use of a composition as claimed in any one of claims 1 to 21 as an antimicrobial, antiviral, anti-retrovirus, or antifungal formulation.

28. An antimicrobial, antiviral, antiretrovirus or antifungal formulation comprising a composition as claimed in any one of claims 1 to 21 in conjunction with a pharmaceutically acceptable carrier, diluent or excipient therefor.

29. Use of a composition as claimed in any one of claims 1 to 21 for the treatment of water, or predominantly water - containing material.

30. Use of a composition as claimed in any one of claims 1 to 21 for the treatment of sewage, industrial or municipal wastes.

31. Use of a composition as claimed in any one of claims 1 to 21 for the treatment of foodstuffs as a disinfectant or bactericide, particularly copper containing such compositions.

32. Use of a composition as claimed in any one of claims 1 to 21 for the preservation of plants, flowers, trees or shrubs.

33. Use of a composition as claimed in any one of claims 1 to 21 in the treatment of a metal for coating, sealing, plating or otherwise forming an anti-corrosive layer upon a metallic substrate.

34. Use as claimed in claim 33 wherein the composition contains one or more of copper, nickel, titanium or vanadium.

FIG. 1

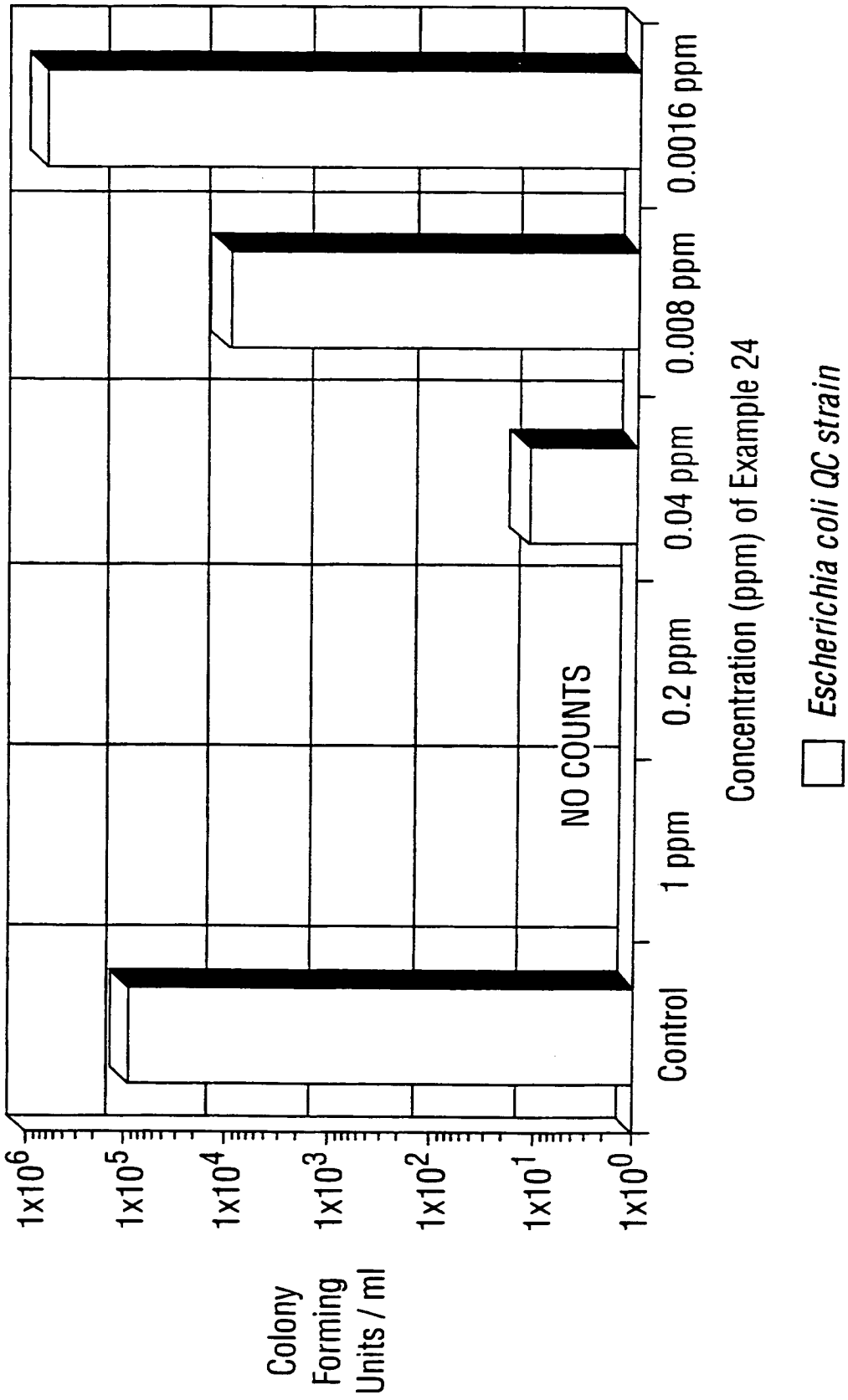

Colony Forming Units / ml
1x10^6
1x10^5
1x10^4
1x10^3
1x10^2
1x10^1
1x10^0
NO COUNTS
Control
1 ppm
0.2 ppm
0.04 ppm
0.008 ppm
0.0016 ppm
Concentration (ppm) of Example 24
Escherichia coli QC strain

FIG. 2

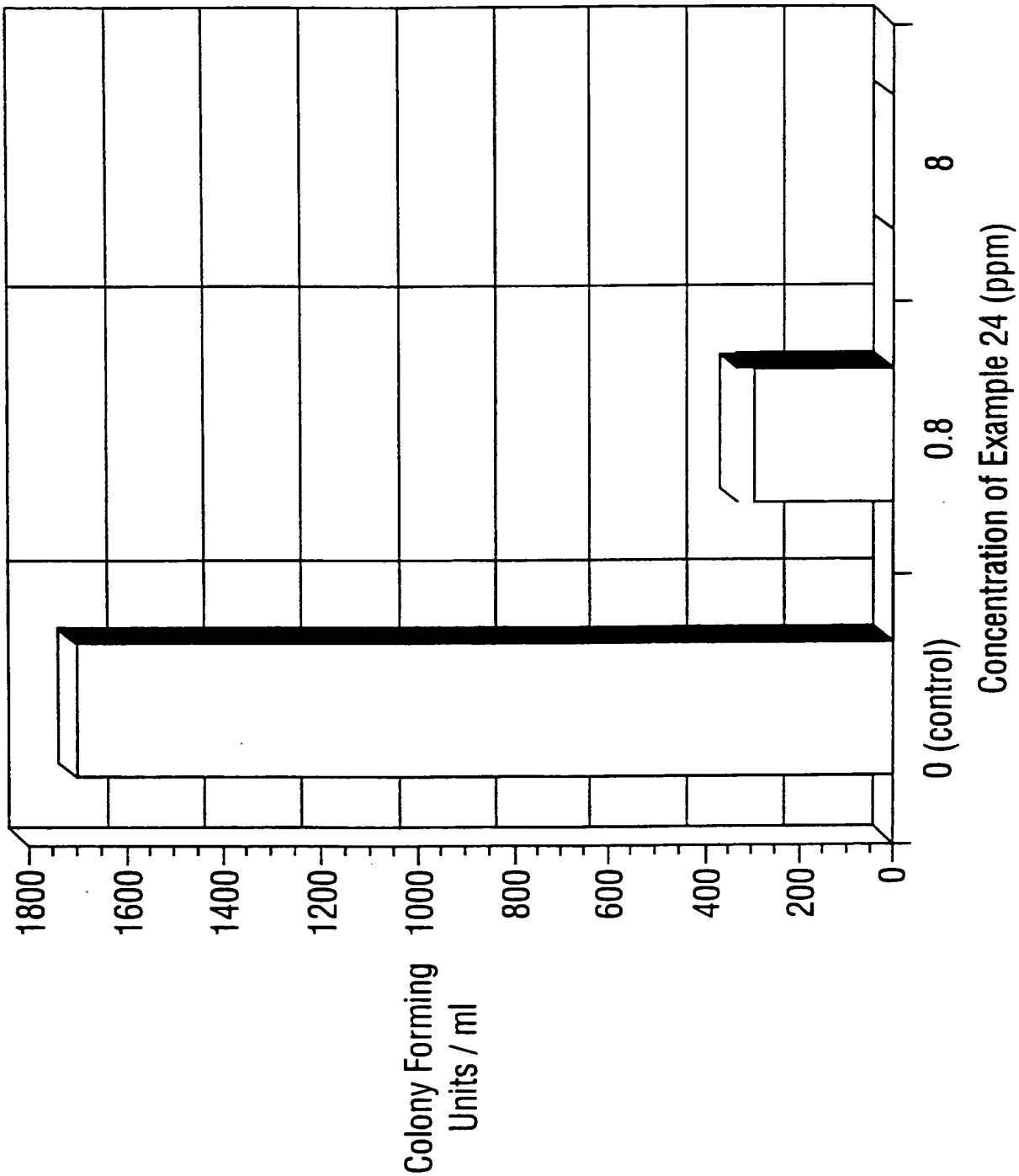

1800
1600
1400
1200
1000
800
600
400
200
0
Colony Forming Units / ml
0 (control)
0.8
8
Concentration of Example 24 (ppm)

FIG. 3

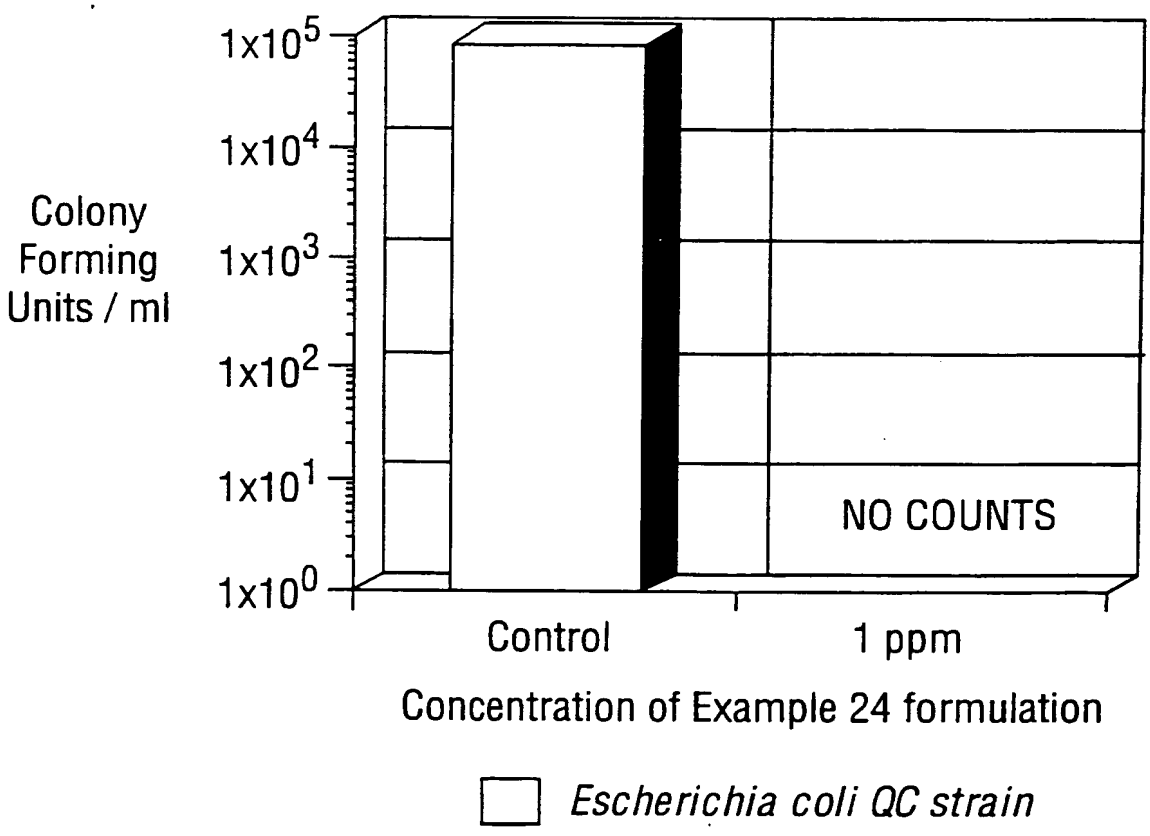
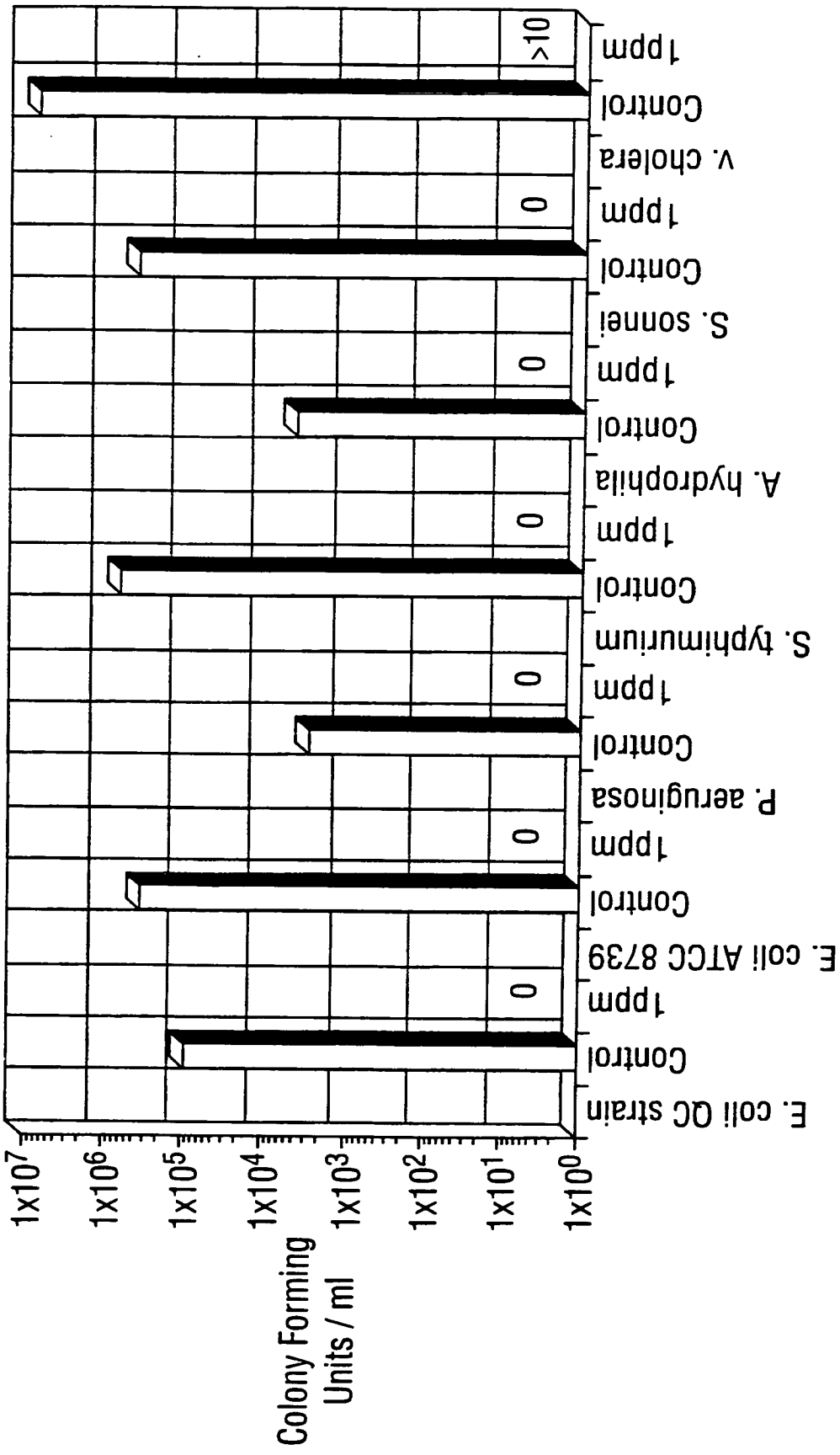

Colony Forming Units / ml
1x10^5
1x10^4
1x10^3
1x10^2
1x10^1
1x10^0
NO COUNTS
Control
1 ppm
Concentration of Example 24 formulation
Escherichia coli QC strain

FIG. 4


Colony Forming Units / ml
1x10^7
1x10^6
1x10^5
1x10^4
1x10^3
1x10^2
1x10^1
1x10^0
E. coli QC strain
Control
1ppm
E. coli ATCC 8739
Control
1ppm
P. aeruginosa
Control
1ppm
S. typhimurium
Control
1ppm
A. hydrophila
Control
1ppm
S. sonnei
Control
1ppm
V. cholera
Control
1ppm
0
0
0
0
0
0
0
<10

INTERNATIONAL SEARCH REPORT

Intern[illegible] Application No
PCT/GB 00/03364

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A23L1/304 A61K31/19 A23L3/358 C02F1/50 C09K15/02
A01N59/16 A01N59/20 C09D1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A23L A61L A61K C02F C09D C09K A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, IBM-TDB, FSTA, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 15201 A (PROCTER AND GAMBLE COMPANY) 1 May 1997 (1997-05-01) claims 1,3 page 1, paragraph 2 page 5, paragraph 3 page 5, paragraph 6 page 6, paragraph 3 page 9, paragraph 2; examples 3,5,8,9	1-9,12, 14,15, 25,26,28
X A	DD 277 093 A (MANSFELD KOM W PIECK FORSCHUNG) 21 March 1990 (1990-03-21) claims 1-4 page 2	1-13,15, 28 33,34
A	WO 91 13552 A (TATE DAVID) 19 September 1991 (1991-09-19) claims; examples	1-20,27, 28,32

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
2 January 2001	09/01/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Heezius, A

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INTERNATIONAL SEARCH REPORT

Inter[redacted] Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 5 908 647 A (KEDZIERSKI BOGDAN KAZIMIERZ ET AL) 1 June 1999 (1999-06-01) claims 1,2,5,6,8,10,17-20; figure 2 column 12, line 20 -column 13, line 19 column 2, line 5 - line 12 column 4, line 59 -column 5, line 2 column 10, line 39 - line 54	1-26
A	US 5 064 468 A (ODA MITSUYUKI ET AL) 12 November 1991 (1991-11-12) claims 1-4	1,33,34
A	US 5 683 724 A (HEI ET AL.) 4 November 1997 (1997-11-04) claims 1-5,11-14	1,27,29, 30

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